Penikese Island Ternery Restoration Project

Year 3 (2000)

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ABSTRACT

The third of a five-year ternery restoration project was conducted from 19 April to 26 July on Penikese Island, Buzzards Bay, Massachusetts. Two personnel were employed by the Massachusetts Division of Fish and Wildlife to camp on the island. Primary duties were to non-lethally discourage nesting gulls on 8 ha of the island ("project area"=Tubb's Island and the Isthmus), to monitor tern nesting, and to protect terns from potential predators and human disturbance. Additionally, personnel conducted a study to assess the effectiveness of decoys in attracting breeding terns, examined foods preyed on by Common Terns, and monitored endangered American burying beetles and other carrion and burying beetles.

One Great Black-backed and fifteen Herring gull nests (from an estimated ten pairs) were found in the project area in 2000. This is similar to the 1999 total of seventeen Herring Gull nests. Human occupation of a campsite on Tubb's and break-up of gull nests were the only methods used to discourage gulls in 2000, while in 1999, dogs were also employed.

Terns nested in three sub-colonies on Penikese: the Isthmus, Tubb's, and South Point. The first Common Tern egg was laid on 13 May and the first Arctic Tern egg about 26 May. Roseate Terns were observed courting and copulating in the Isthmus sub-colony early in the season, and they were present almost daily around the tern nesting areas but they did not nest in 2000. Nearly all tern nests laid before 22 May were deserted after a Peregrine Falcon (*Falco peregrinus*) visited the island for two or three days during a storm. In all, there were 267 Common Tern nesting attempts, from an estimated 186 breeding pairs; this is a 41% increase over the estimated number of pairs in 1999 (132). Four or five Arctic Tern pairs nested on Penikese in 2000, but only one chick is known to have hatched; it died the day after hatching.

For Common Terns, average clutch size was 2.5 eggs/nest, hatching success was 77%, fledging success was 36 – 81%, and productivity was 0.7 – 1.7 chicks fledged/nest. Nests on Tubb's experienced prolonged incubation periods (on average, about eight days longer than normal) due to nighttime colony desertion; the reason for this abandonment is unknown. Ants preyed upon two chicks on the Isthmus in the vegetation and eight or nine chicks and three hatching eggs on Tubb's, where the eelgrass nesting substrate appeared to offer suitable habitat for ants. Ant traps placed in the colonies showed that ants were more abundant in the vegetation than on the cobble. The very wet weather this year may have been favorable for ant populations. In contrast to 1999, gull predation had only a minor effect on tern productivity: only two instances of predation by a Great Black-backed Gull on tern chicks were noted in 2000.

From 12 April to 26 July, 113 species of birds were recorded on Penikese. Of these, 81 species were migrants or non-breeders, 21 species were confirmed nesters, and 11 additional species possibly nested. During the course of the nesting season, 185 Common Tern chicks, 59 Common Tern adults, 111 Herring Gull chicks and 28 Great Black-backed Gull chicks were banded.

Introduction

The following report highlights the activities of the third year (2000) of ternery restoration efforts on Penikese Island, located in Buzzards Bay, by the Massachusetts Division of Fisheries and Wildlife (MassWildlife). Penikese Island was formerly a major nesting colony for Common (*Sterna hirundo*) and endangered Roseate (*Sterna dougallii*) terns in Buzzards Bay, but these terns were eventually displaced by Herring (*Larus argentatus*) and Great Black-backed (*L. marinus*) gulls. Because Roseate Terns prefer nesting within large colonies of Common Terns, recovery efforts aimed at Roseate Terns necessarily involve the maintenance of heathly populations of Common Terns. The goals of the five-year project on Penikese Island include: 1) re-establishing, protecting, and monitoring a thriving colony of Common (1000 breeding pairs) and Roseate Terns (200 breeding pairs) and 2) discouraging the nesting efforts of breeding gulls on an 8-ha portion of the island (the "project area"). Penikese Island consists of a main island, a smaller, northeast section known as Tubb's Island, and an isthmus connecting these two sections. The project area includes only the Isthmus and Tubb's Island.

Methods

Logistics

A Site Manager (Carolyn Mostello) and a Site Assistant (Gina Reppucci) began work in April. Equipment and supplies used in the 1998 and 1999 seasons were reused in 2000, and a few more items were purchased. Personnel pre-staged gear on-island on 12 April. Occupation of Penikese by personnel began 19 April, however high winds and inclement weather made set-up of the camp infeasible, so personnel lived at Penikese Island School for a few days, then departed on 21 April and returned 26 April. Camp set-up was finally accomplished on 27 April. The camp was occupied every night through 25 July, and was broken down 24-26 July; personnel departed 26 July. In total, there were 95 days of site coverage for Penikese in 2000. Most equipment and supplies were stored at MassWildlife's Field Headquarters in Westborough, and a few items, including observation blinds, were stored on-island in Penikese Island School's facilities. While on-island, personnel used a cellular phone for communications. Penikese Island School provided transport to and from the island, meals as needed, water, and help with moving heavy gear. Staff and students also constructed tern chick-shelters.

Gull Harassment

In 2000, gull harassment consisted of human occupation of site and nest break-up. Dogs were not used to harass gulls, as was the case in 1998 and 1999, because the only part of the project area that contained territorial gulls when personnel arrived on-island was on the Isthmus in the vicinity of an active American Oystercatcher nest.

> ***Human occupation of site***: A field camp, consisting of a large canvas wall tent and two small personal tents, was set up on Tubb's Island in the same location as in 1998 and 1999. Personnel spooked gulls as necessary to prevent them from settling in the project area. Nearly every night from 19 April to 21 May at approximately half-an-hour prior to sunset, personnel circled Tubb's Island and spooked gulls in the area. Then at sunset,

adult gulls were counted on Tubb's, northward to the narrowest neck of the Isthmus, and in waters adjacent to these areas.

Break-up of nests and eggs: From late-April through July, periodic searches for gull nests were made in the project area. Nests were marked with flags and generally followed until the clutch was complete (three eggs) or until no new eggs had been laid for three to four days. The nest foundations and eggs were then destroyed.

Gull Census and Banding

A census of all gull nests on Penikese Island was conducted between 24 May and 6 June. Sections of the main island were demarcated using natural markers and flags and were systematically searched. Each nest was marked using a dot of spray paint (placed about 1 m from the nest) to avoid double-counting nests. Walking through some heavily-vegetated areas was very difficult and posed a threat to hidden chicks; in these locations, gulls were flushed and then counted as they resettled on their territories. All nests present during routine nest searches on Tubb's and the Isthmus from 24 May and 6 June were included in the census total. Gull chicks on the main island were banded from 9 to 21 July.

Tern Colony Research and Monitoring

"Restricted Area" signs were erected on the Isthmus and Tubb's in late-April. Common and Roseate Tern decoys were also placed in nesting areas on the Isthmus and Tubb's in late-April. They were moved to specific "decoy study plots" (see below) on 6 and 7 May. Several tern nestboxes were placed on the Isthmus in mid-May. Two observation blinds on the Isthmus and one on Tubb's were used to monitor tern colonies. The northwest Isthmus grid (consisting of 10 m x 10 m plots), which was established in 1999, had been partially destroyed by the beginning of this season. We reestablished this grid and also laid out two more grids: one on Tubbs and one on the southeast portion of the Isthmus. The NW Isthmus and Tubb's grids were left up at the end of the season; the SE Isthmus grid was removed.

Nest Checks: With the first observation of tern eggs on the Isthmus, daily nest checks began. On Tubb's, nest checks were conducted every other day. Each nest was marked with a numbered paint stick and its location within each plot was recorded. Nests were checked until the clutch was complete (three eggs) or until no new eggs were present for three to four days. The A-egg was weighed within the first week after laying. At 21 days, eggs were checked for evidence of starring or pipping. At hatching, all A- and B-chicks and some C-chicks (those in productivity plots) were banded. Several large, unbanded C-chicks from outside productivity plots were banded later in the season. The South Point colony was visited biweekly. Nests were counted but were not marked and no chicks were banded.

Adult Tern Capture: At many Common Tern nests that were at least ten days old (particularly those known to have banded adults), at least one adult was captured using a treadle (walk-in) trap. Unbanded individuals were banded. All adults were weighed, and exposed culmen and distance from back of skull to bill tip were measured. At least one bird from each of these nests was marked with a spot of permanent ink on the cheeks to distinguish it from its mate during feeding watches (see below).

Productivity Plots: (Productivity plots should not be confused with 10 m x 10 m grid plots.) Productivity plots for monitoring growth and survival of Common Tern chicks consisted of areas enclosed with 1'-high chicken wire. To prevent chicks from trying to wedge themselves through the chicken wire, 6"- to 10"-high fiberglass screening was attached to the inside of the chicken wire. Its base was buried in the substrate along with the base of the chicken wire, and the upper edge was attached to the chicken wire at 6" intervals using monofilament or twisties. These short intervals were necessary because the screening tended to gap, providing opportunities for chicks to become trapped between the screening and the chicken wire. On the Isthmus, 32 chicks at 15 nests were monitored in two areas, and on Tubb's, 15 chicks at 8 nests were monitored in one area. Wooden shelters were placed within plots to accommodate chicks that were now unable to seek cover outside plots. Chicks were weighed on days zero, four or five, and every other day thereafter until fledging. Nests within plots were synchronized so that after the initial weighings of young chicks, each plot only needed to be entered every other day.

Decoy Watches: In cooperation with J. Arnold (U. Mass., Boston), personnel conducted a study to assess the effectiveness of tern decoys in attracting nesting birds to study plots. Decoys were placed in experimental plots on the NW Isthmus, SW Isthmus, and Tubb's. Plot size ranged from 10 m x 10 m (NW Isthmus) to 20 m x 20 m (SW Isthmus and Tubb's); each plot contained twelve decoys per 10 m x 10 m area. Control plots of the same size were also designated for each of these areas. For approximately two weeks, two watches a day (generally from 0545 to 0745 and from 1700 to 1900) were conducted, during which the presence and activities of terns in study plots were recorded. Number of nests in plots was recorded along with normal tern monitoring activities. J. Arnold will analyze these data.

Feeding Watches: Common Tern feeding watches were conducted on the Isthmus on 20 June (from 0800 to 1100; three nests observed) and 28 June (from 0700 to 1000; seven nests observed). All nests observed were those for which at least one parent previously had been color-marked on the cheeks so that it could be distinguished from its mate. For the second watch (when more than one chick was present per nest), chicks were individually colored under the chin with permanent marker. Prey items brought to study nests were identified, prey length was estimated, and which parent brought the prey, which chick consumed the prey, and arrival and departure times of parents were recorded. These data will be compared at a later date to those gathered on Bird I. and Ram I. further north in Buzzards Bay.

Ant Observations: The distribution of tern nests on Penikese may be influenced by the presence/absence of ants (*i.e.*, the relative lack of tern nesting in vegetated areas may be due to larger numbers of ants there). In cooperation with I. Nisbet (I. C. T. Nisbet and Co.), personnel initiated a study to compare tern nesting activity in vegetated and unvegetated experimental plots (where ants were controlled with ant bait) and control plots (containing no ant bait) on the NW Isthmus, SW Isthmus, and Tubb's. Sugar-based and protein-based ant baits (Drax Ant Kil and Drax Ant Kil PF) were combined in small (est'd. 2" diameter) plastic petri dishes that had holes drilled in the sides. In mid-May, about 17 bait dishes were placed at regular intervals and weighted down with rocks in each 10 m x 10 m experimental plot. Numbers of ants in each were counted in the first day or two after placement. Different ant species were also collected for identification purposes. In mid-June (after most bait had been consumed), four traps with bait

were again placed in each study plot, and numbers of ants were counted the next day. Number of tern nests in plots was recorded along with normal tern monitoring activities.

General Bird Observations

Personnel recorded all bird species noted on Penikese on 12 April and from 19 April to 26 July.

Burying and Carrion Beetle Monitoring

Personnel set out six Mason-type jars baited with rotten meat to capture burying and carrion beetles; the primary goal was to confirm the presence of the reintroduced endangered American Burying Beetle (*Nicrophorus americana*). Jars were placed in shaded areas at intervals along the trail to the cemetery beginning near the northern end of the school grounds and ending close to the cemetery. To prevent flooding of jars, the top of each jar was 1" to 2" above ground level (dirt was mounded up to allow beetles to enter the jar) and jars were covered with wooden boards. Chicken, gull, sardine, rabbit, and (primarily) harbor seal meat (from a carcass that washed up) were used as bait. Except for a one-week period in June when jars were removed, jars were checked every morning from 30 April to 4 July. Beetle species were identified, counted, and released.

Results and Discussion

Gull Harassment

As in 1999, there was very little gull activity in the project area in 2000. Gulls occasionally landed on the dome of Tubb's, particularly in the early mornings. Gulls regularly loafed around the perimeter of Tubb's, loafed and foraged on the large accumulation of seaweed on the ocean-side of the Isthmus, and loafed on the center of the Isthmus in the low vegetation (dominated by storksbill) close to the pond.

Evening gull counts on Tubb's and the Isthmus yielded as few as zero gulls to as many as 31 (Table 1). Nearly all gulls were loafing on the perimeter of the island and not in the interior. Mean number of gulls per night (8.7) was lower than in 1999 (15) (Mostello and Sulzman 1999). Gull nesting in the project area was almost completely suppressed in 2000. Fifteen Herring Gull nests and one Great Black-backed Gull nest were located in the project area, and 33 eggs were destroyed (Table 2). One of these nests disappeared before it could be destroyed, and another was not found until it was hatching, so it was not destroyed. Discovery dates of gull nests in the project area ranged from 6 May to 29 June. The 15 Herring Gull nests probably represented at least ten pairs of gulls. The number of nests found in 2000 was very similar to the number (17) found in 1999 (Mostello and Sulzman 1999).

Gull Census

From 24 May to 6 June, 1124 gull nests were counted on Penikese (Table 3). This represents an 11.5% increase over the 1999 total (Mostello and Sulzman 1999). Great Black-

backed Gull nests accounted for 11.6% of these, as compared to 12.6% in 1999. Only 0.6% of the total nests were in the project area.

Tern Nesting

Common Terns were first sighted on Penikese on 28 April, Roseate Terns on 4 May, and Arctic Terns on 8 May. In contrast to 1999, when a maximum of only 150 terns staged on the Isthmus, hundreds of terns (including many Roseates) staged on the Isthmus in mid-May; the highest count was 600 on 17 and 18 May.

Tern nesting occurred in three areas of Penikese Island in 1999: the Isthmus, Tubb's Island, and South Point on the main island. The area utilized for nesting on the Isthmus in 1999 was approximately the same as was used in 1998. Most nests were laid in the cobble, and only two were located in the vegetation. Terns nested in the same general area on Tubb's as was used in 1999, but they occupied a greater length of the beach. The distribution of nests was also different than in 1999. In 1999, nests were situated on the highest (flat) portion of the cobble beach. In 2000, almost all nests were laid closer to the water, where the beach drops off fairly steeply to a thick old wrack-line. Most nests were laid in this wrack, or at approximately the same distance from the water as those in the wrack. (This wrack-line was present in 1999, but it was used only by Arctic Terns for nesting.) The wrack became thickly vegetated with *Chenopodium* sp. as the season progressed. Additionally, three nests were located just out of sight of the core colony (to the west, towards Tubb's Pond); a lone nest was laid farther west near Tubb's Pond. The South Point colony occupied the same area as in 1999.

Common Terns: The first Common Tern egg was found on 13 May on the Isthmus, and egg laying continued through at least 24 July (personnel departed 26 July). An estimated 186 pairs of Common Terns nested on Penikese in 2000 (Table 4). This is a 41% increase over the number of pairs in 1999. Approximately two-thirds of the pairs nested on the Isthmus and one-third on Tubbs. Few nests were laid at South Point. Numbers of nests laid in decoy study experimental and control plots on the NW Isthmus and Tubb's are presented in Table 5. These data provide some indication that decoys may influence numbers or distribution of nesting terns within the colony, but further analysis is required to properly address this question.

The total number of nesting attempts for 2000 (267) is much higher than the estimated number of breeding pairs (Table 4). The primary reason for this is the May desertion of the three sub-colonies; this may have been due to harassment or predation by a Peregrine Falcon (*Falco peregrinus*) present on Penikese for two or three days during very windy, rainy weather. By 20 May, 42 nests were present on the Isthmus, three on Tubb's, and seven on South Point. Nearly all of these, plus several nests laid shortly after 20 May, were abandoned by 22 May. The falcon was sighted over Tubb's on 18 May, and flying over the Isthmus tern colony on 20 May. No evidence of falcon predation on terns was ever found. Abandoned eggs rapidly were consumed by gulls and blackbirds. About a week after the desertion, there was a resurgence of nesting on the Isthmus and Tubb's, but not at South Point. There were a few other notable sources of nest failure and chick death in 2000. High surf due to a Nor'easter on 6-7 June caused complete failure of eleven nests and death of one or two eggs in several other nests. Ants caused deaths of two chicks on the Isthmus and eight or nine chicks and three hatching eggs on Tubb's (see

below). Nighttime desertion of the Tubb's colony probably caused a few chick and egg deaths, and the resulting prolonged incubation caused nest abandonments by parents (see below).

Average clutch size for Common Terns in 1999 was 2.5 eggs/nest, excluding doubtful one-egg nests (Table 6). This value is lower than the 1999 and 1998 values of 2.9 and 2.6 eggs/nest, respectively (Blodget 1998, Mostello and Sulzman 1999). Common Terns laid 568 eggs on the Isthmus and Tubb's in 2000, but 98 of these were abandoned 20-22 May. (In the 23 nests in productivity plots, 60 eggs were laid and average clutch size was 2.6 eggs/nest.)

The first Common Tern chick hatched 17 June, considerably later than the first-hatch date for both 1999 and 1998 (5 June) (Blodget 1998, Mostello and Sulzman 1999); this was due to the abandonment of the earliest nests around 20-22 May (see above). Median lay date of first eggs was about 5 June. Hatching success was 77.2%, excluding doubtful nests (Table 7); this is lower than in 1999 (90.5%). Mean number of chicks/nest was 2.0 (excluding doubtful nests), compared to 2.4 chicks/nest in 1999. (For the 23 nests in productivity plots, hatching success was 81.7%, resulting in 2.1 chicks/nest.)

Upon departure of personnel at the end of the season, 36.2% of Common Tern chicks in productivity plots had fledged, and another 44.7% appeared to be growing normally; only one chick in the productivity plots was presumed to have been predated by a gull (Table 8). Productivity was 0.7 to 1.7 chicks fledged/nest. Several parents were able to raise three chicks to fledging or near-fledging before personnel departed 26 July (Table 9), and several large C-chicks were noted outside of productivity plots as well. The linear growth rate (LGR) of chicks from day 4 to day 14 (a subset of all the chicks in plots) was 7.4 g/day overall, and LGR was higher on the Isthmus (7.6 g/day) than it was on Tubb's (7.1 g/day). In 1999, personnel noted a few chicks with bloody feet in the productivity plots, and suspected that there was a stray wire poking out of the fencing somewhere. However, this year the true cause for the bloody feet was revealed: chicks desperate to escape the plot repeatedly scraped their feet against the rocks as they pushed against the fencing. Chicks sometimes lost large amounts of blood, and in one case, this appeared to be the cause of death of a fledgling from outside the plot that landed in the plot but could not escape.

In 1999, Common Tern chicks on Tubb's remained in the general vicinity of their nests, and three-chick broods were regularly observed. In 2000, in contrast, chicks disappeared from the core of the colony. Many moved to the far fringes of the colony, and full broods were much less frequently observed than in 1999. The reasons for this are unknown, but perhaps parents moved their chicks to escape ants or nighttime predators (see below) in the core colony. The youngest chicks known to have been moved to the colony edge were missing from the nest at approximately four and six days-old, and were discovered at the colony edge four days later. The Tubb's colony was also very quiet, in contrast to the 1999 colony, so the poor productivity within the study plot was probably a fairly accurate reflection of the situation outside the plot.

In 2000, 48 previously-banded (Table 10) and 57 unbanded adults were trapped at nests on the Isthmus and Tubb's. Most of these were originally banded on Great Gull Island, NY (38%) and Penikese (29%). Known-age adults (n=28) ranged from two years old (three individuals banded as chicks on Penikese in 1998) to nineteen years old (one individual banded

as a chick on Bird I. in 1981). However, 61% of known-age adults were banded as chicks in 1993, 1994, and 1995 (Table 11). Mean age of known-age adults was 6.6 years.

During the two Common Tern feeding watches, at least four species of fish were identified. These included: Atlantic herring, hake sp., sand launce, and cunner. In addition, during general colony observations, butterfish, pipefish, silversides, beetles, and possibly anchovy were seen. In general, the diversity of prey items observed in 2000 was lower than in 1999 (Mostello and Sulzman 1999). In 2000, sand launce appeared to be the predominant prey item throughout most of the season, whereas in 1999, herring and hake were much more important.

Arctic Terns: The first Arctic Tern nest (containing two eggs) was discovered on Tubb's on 26 May. One egg disappeared. The other egg hatched on 19 June and the chick was found dead a couple feet from the nest on 20 June. The cause of death is unknown. This was the only Arctic Tern chick known to have hatched on Penikese in 2000. Three other Arctic Tern nests (all two-egg clutches) were found on Tubb's. One never hatched and the parents abandoned it and probably renested on Tubb's. Two others were scheduled to hatch after personnel departed 26 July; however, there were no active nests present on Tubb's when personnel paid a site visit to Penikese on 16 August. On the Isthmus, a two-egg Arctic Tern nest was laid so close to the water that it was washed out during a normal high tide. This same pair probably renested on the Isthmus, but personnel departed before the two-egg nest hatched. The new nest probably failed: no Arctic Terns were heard on the Isthmus during the 16 August site visit. Arctic Tern egg-laying continued through 10 July.

In 1999, one nesting adult Arctic Tern was previously banded, and personnel banded one other adult. In 2000, none of the Arctic Terns present was banded.

Roseate Terns: No Roseate Terns nested on Penikese in 2000. Roseates were observed flying over Tubb's, South Point, and the Isthmus or loafing at the waterline in the Isthmus colony on most days from 4 May to 26 July. As many as 100 Roseates were observed on 17 and 25 May. Roseates occasionally were seen landing in the colony, particularly before the tern colony was deserted 20-22 May. At least four copulations or mountings and five courtship feedings were noted. (This contrasts with the 1999 situation, in which Roseates only rarely landed, and did not court, within the Isthmus colony.) Unfortunately, Roseate courtship declined subsequent to the colony desertion. Roseates staged along with Common Terns at Penikese at the end of the season.

Nighttime Desertion of Tubb's Colony: In 2000, many Common Tern nests in the Tubb's colony experienced protracted incubation periods due to parental desertion of the colony at night. The average incubation period for seven nests in the Tubb's productivity plot was 31 days (range, 26 to 35 days), an increase of 35% over the normal incubation period of about 23 days. (One additional nest was starred at 24 days, but was then abandoned.) This desertion probably occurred throughout the season, based on the length of incubation for some nests, but the situation was not discovered until July. The reason for this desertion is unknown. Several visits to the colony at night did not reveal any predators. A few times, the handful of terns remaining at night were giving alarm calls and hovering over a specific area of the colony, and once it appeared that a rabbit on the cobble was the cause for the alarm. No evidence of broken eggs or

predation upon chicks or adults (besides for gull predation on one chick) was encountered in the colony. The long incubation periods probably caused some parents to abandon live eggs. Two newly-hatched chicks and one egg hatching at night probably died of exposure because parents were not attending the nests. The feathers of another chick that hatched at night did not fluff out (perhaps due to the lack of brooding) and the chick was attacked by ants and died. Lack of incubation by parents may have allowed ants to enter and kill three hatching eggs. Perhaps the observed movement of chicks to the fringes of the colony was an attempt to escape nighttime predation in the core colony.

Human Disturbance: Although a few unauthorized visitors were noted on the Isthmus and Tubb's Island in 2000, no unauthorized human disturbance was known to occur within the tern nesting areas.

Predation: Gull predation on tern chicks did not appear to be a significant factor limiting productivity in 2000. Great Black-backed Gulls were seen taking tern chicks on two occasions: 10 July (on the Isthmus) and 11 July (on Tubb's). Increased monitoring of the sub-colonies did not reveal any more predation. One apparently healthy chick was missing from the Tubb's productivity plot after the predation event there was observed, so it was presumed to have been predated. Besides for predation by ants (see below), no other instances of predation were noted on Penikese in 2000, although the Peregrine Falcon may have preyed on terns.

Ant Monitoring and Ant Observations

Monitoring ant abundance turned out to be somewhat problematic. Ant traps were dragged out from under rocks, presumably by mice. Earwigs entered traps through the holes in the sides and rapidly consumed the bait. Many traps were washed away during the 6-7 June Nor'easter. Despite these problems, some qualitative data were gathered: ants were quite abundant in those traps placed in the vegetation, whereas they were nearly absent from those placed on the cobble.

Ants did prey on Common Tern chicks in 2000, particularly on Tubb's. There was no evidence of ant predation on chicks in 1999. It may be that the very wet 2000 season provided more favorable conditions for ants than did the extremely dry 1999 season. The only two chicks killed by ants on the Isthmus were from one of two nests in the vegetation. Even though no nests technically were laid off the beach in the vegetation on Tubb's, the eelgrass wrack-line and small eelgrass clumps in which nests were laid apparently were suitable habitat for ants, and eight or nine chick deaths and deaths of three hatching eggs were attributed to ants. (When the ant problem was discovered, personnel tried to keep track of all chicks for the first few days after hatching to quantify the extent of the predation.) Chicks were bitten on the legs, eyes, and mouths; ant-bitten chicks were not brooded by parents. Attempts to locate ants in nests before tern eggs hatched were unsuccessful: ants appeared only after eggs began to hatch.

Beetle Monitoring

During the course of the season (360 trap-nights), one American burying beetle, 257 common burying beetles (*Nicrophorus orbicollis*), and 145 *Necrophila americana* (a carrion beetle) were captured in the six traps. Additionally, one *Necrodes surinamensis* (a carrion

beetle) was found in a bag of rotting meat. Beetle numbers in traps were low until the last week of May, when they increased suddenly and remained high through the first week of June. Unfortunately, beetle mortality was also high in traps. Because trap contamination was suspected, traps were removed on 8 June. They were thoroughly washed and replaced in the same locations on 14 June. Beetles were less abundant in traps after 14 June. Beetle mortality did not end, so the traps were permanently removed on 4 July. It appears unlikely that the bait was contaminated because mortality occurred with both bird and seal bait.

Other Wildlife

On the Isthmus and Tubb's, terns were often observed hovering over snakes – probably mostly Eastern garter (*Thamnophis sirtalis*) and occasionally Northern brown (*Storeria dekayi*) snakes – present within the colony. Predation on, or scavenging of, tern eggs and chicks was not observed; however, it is possible that snakes were responsible for disappearances of several eggs.

On 26 June, mammal tracks thought to be those of a muskrat were discovered on the sandy beach of the Isthmus. Similar tracks were noted on this beach the same time last year (23 June).

Two harbor seal carcasses washed up on Penikese in 2000. One was disturbed by Penikese Island School students, so it was buried. Meat for use in beetle traps was salvaged from the other, and the carcass was dragged into the vegetation so that the skeleton could be salvaged after the carcass decomposed; it was not yet totally decomposed by the end of the season.

Banding Activities

In 2000, 185 Common Tern chicks, 59 Common Tern adults, 111 Herring Gull chicks, and 28 Great Black-backed Gull chicks were banded (Table 12).

General Bird Observations

On 12 April and from 19 April to 26 July, 113 species of birds were observed on Penikese (Appendix 1). Of these birds, 81 species were migrants or non-breeders, 21 species were confirmed nesters, and eleven were listed as possible nesting species.

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Literature Cited

Blodget, B. G. 1998. Penikese Island ternery restoration project: Year 1 (1998). Final Report to the Massachusetts Environmental Trust. Massachusetts Division of Fisheries and Wildlife. Westborough, MA. 27 pp.

Mostello, C. and C. Sulzman. 1999. Penikese Island ternery restoration project: Year 2 (1999). Final Report to the Massachusetts Environmental Trust. Massachusetts Division of Fisheries and Wildlife. Westborough, MA. 24 pp.

Table 1. Adult gull counts on Tubb's, the southeast portion of the Isthmus, and in waters adjacent to these sites following evening harassment activities from 19 April to 21 May 2000[a].

Date	Herring Gull	Great Black-backed Gull	Total Gulls
19 April	10	0	10
20 April	24	2	26
26 April	10	0	10
28 April	25	6	31
29 April	2	1	3
30 April	21	0	21
1 May	0	0	0
2 May	0	0	0
3 May	8	5	13
4 May	1	0	1
5 May	3	4	7
6 May	2	0	2
7 May	0	1	1
8 May	0	2	2
9 May	8	2	10
10 May	0	0	0
11 May	16	3	19
12 May	4	4	8
13 May	2	0	2
14 May	3	3	6
15 May	8	3	11
16 May	6	1	7
17 May	1	2	3
20 May	12	3	15
21 May	7	3	10
Mean count	**6.9**	**1.8**	**8.7**

[a] from Tubb's northwestward to the narrowest neck of the Isthmus

Table 2. Herring (HERG) and Great Black-backed (GBBG) gull nest breakup activities in the project area on Penikese Island, 2000.

Date	No. of nests dispersed	No. of eggs destroyed	Species
7 May	1	1	GBBG
27 May	2	4	HERG
30 May	1	3	HERG
2 June	1	2	HERG
3 June	2	5	HERG
10 June	1	3	HERG
13 June	1	3	HERG
14 June	1	3	HERG
25 June	1	2	HERG
27 June	1	3	HERG
28 June	1	1	HERG
29 June	1	3	HERG
Total	**14** [a]	**33**	**-**

[a] Two additional Herring Gull nests were found. A 1-egg nest found 19 June was missing 21 June. A 3-egg nest was hatching when it was discovered 27 June; it was not destroyed.

Table 3. Census of Herring (HERG) and Great Black-backed (GBBG) gull nests on Penikese Island, 24 May to 6 June 2000.

Area	HERG nests	GBBG nests	Total nests
Main island	987	130	1117
Tubb's	7	0	7
Isthmus	0	0	0
Total	**994**	**130**	**1124**

Table 4. Distribution of A- and B-period Common Tern nesting attempts[a] and estimated number of breeding pairs[b] among the three nesting areas on Penikese Island, 2000.

	A-period nests (13 May to 20 June)				B-period nests (21 June to 24 July)				Season total nests			
Area:	Isth.	Tubbs	South Point	Total	Isth.	Tubbs	South Point	Total	Isth.	Tubbs	South Point	Total
No. nesting attempts	139	60	7	206	51	8	2	61	190	68	9	267
Estimated number of breeding pairs	74	52	0	126	51	8	1	60	125	60	1	186

[a] Total number of nesting attempts, including all abandoned nests.

[b] Approximate number of pairs that attempted to nest. This value excludes all nests that failed prior to 10 June, because these pairs may have relayed before 20 June. True value may be slightly higher or lower than estimated value.

Table 5. Numbers of Common Tern nests in decoy study experimental (containing decoys) and control (containing no decoys) plots on the NW Isthmus and Tubb's on Penikese Island, 2000.

Location	No. nests		
	Experimental plots	Control plots	Total
NW Isthmus	23	12	35
Tubb's	14	11	25
Total	**37**	**23**	**60**

Table 6. Common Tern clutch sizes for A[a]- and B-period nests on Penikese Island, 1999 (Tubb's and the Isthmus only).

	A[a]-period nests (23 May to 20 June)		B-period nests (21 June to 24 July)		Season total nests	
Clutch size	No. nests	% of total	No. nests	% of total	No. nests	% of total
5	1	0.7	0	-	1	0.5
4	1	0.7	0	-	1	0.5
3	86	59.3	11	19.0	97	47.8
2	39	26.9	36	62.1	75	36.9
1	18	12.4	11	19.0	29	14.3
Mean clutch size[b]	2.5 (2.7)		2.0 (2.1)		2.4 (2.5)	

[a] Excludes nests that failed prior to 23 May, but includes nests that failed between 23 May and 10 Jun.
[b]values in parentheses exclude those one-egg nests thought to be "dumped" eggs

Table 7. Common Tern hatching success[a] on Penikese Island, 2000 (Tubb's and the Isthmus only).

Clutch size	No. nests	No. chicks hatched	Mean no. chicks per nest	Hatching success (%)
3	85	202	2.4	79.2
2	39	55	1.4	70.5
1[b]	19 (5)	4	0.2 (0.8)	21.1 (80.0)
Total[b]	**143 (129)**	**261**	**1.8 (2.0)**	**74.1 (77.2)**

[a]Values exclude nests that may not have had time to hatch, including Tubb's nests, many of which had prolonged incubation periods due to nighttime colony desertion (see text). This probably biased the values upward, because some nests containing infertile eggs may have been excluded from the sample.
[b]Values in parentheses exclude those one-egg nests thought to be "dumped" eggs.

Table 8. Fates of Common Tern chicks in productivity plots on Penikese Island[a].

Plot Number	No. Fledged	No. Unfledged/ Healthy	No. Predated	No. Dead/ Not Predated	**Total Chicks**
1	9	10	0	1	**20**
2	4	5	0	3	**12**
Tubb's	4	6	1	4	**15**
Total	**17 (36%)**	**21 (45%)**	**1 (2%)**	**8 (17%)**	**47 (100%)**

[a]Plot 1 chicks weighed through 15 July, Plot 2 chicks weighed through 17 July, Tubb's chicks weighed through 26 July.

Table 9. Fates of Common Tern A-, B-, and C-chicks within productivity plots on Penikese Island.

Chick Order	No. Fledged	No. Unfledged/ Healthy	No. Predated	No. Dead/ Not Predated	**Total Chicks**
A	7	8	0	5	**20**
B	8	8	0	1	**17**
C	2	5	1	2	**10**
Total	**17**	**21**	**1**	**8**	**47**

Table 10. Previously-banded Common Tern adults trapped at nests on Penikese Island, 2000.

Band Number	Date Trapped	Sub-colony	Date Banded	Banding Location	Banding Age
882-80206	9 Jun	Isthmus	9 Jun 86	near Wareham, MA	Chick
892-62168	16 Jun	Isthmus	10 Jun 92	near Wareham, MA	ASY
892-63521	22 Jun	Tubb's	11 Jul 92	near Wareham, MA	Chick
892-68682[b]	14 Jun	Isthmus	21 Jun 94	Bird I., MA	Chick
892-74032	19 Jun	Tubb's	24 Jun 87	Great Gull I., NY	Chick
892-80675	16 Jun	Isthmus	18 Jun 88	Great Gull I., NY	Chick
892-89462	24 Jun	Isthmus	2 Jun 95	near Mattapoisett, MA	ASY
892-91855	14 Jun	Isthmus	19 Jun 95	near Mattapoisett, MA	ASY
892-91861[b]	29 Jun	Tubb's	19 Jun 95	Ram I., MA	ASY
892-92040	19 Jun	Tubb's	29 Jun 95	near Mattapoisett, MA	Chick
892-92370	15 Jun	Isthmus	5 Jun 96	near Mattapoisett, MA	ASY
892-92380	21 Jun	Isthmus	6 Jun 96	near Mattapoisett, MA	ASY
892-92397[b]	14 Jun	Isthmus	10 Jun 96	Ram I., MA	ASY
972-64483[b]	16 Jun	Isthmus	17 Jun 93	Falkner I., CT	Chick
972-66621 (replaced w/ 1192-14804)	17 Jun	Isthmus	22 Jun 93	Falkner I., CT	Chick
1103-64215[b]	23 Jun	Tubb's	07 Jun 81	Bird I., MA	Chick
1162-65446	26 Jun	Isthmus	19 Jun 98	Penikese I., MA	Chick
1162-65450 (replaced w/1103-12753)	29 Jun	Tubb's	21 Jun 98	Penikese I., MA	Chick
1162-65546	5 Jul	Tubb's	1 Jul 98	Penikese I., MA	Chick
1162-65567	26 Jun	Isthmus	1999	Penikese I., MA	ASY
1162-65572	26 Jun	Isthmus	1999	Penikese I., MA	ASY
1162-65578	15 Jun	Isthmus	1999	Penikese I., MA	ASY
1162-65582	22 Jun	Tubb's	1999	Penikese I., MA	ASY
1162-65584	17 Jun	Isthmus	1999	Penikese I., MA	ASY
1162-65586	10 Jun	Isthmus	1999	Penikese I., MA	ASY
1162-65587	14 Jun	Isthmus	1999	Penikese I., MA	ASY
1162-65590	24 Jun	Isthmus	1999	Penikese I., MA	ASY
1162-65593	15 Jun	Isthmus	1999	Penikese I., MA	ASY
1162-65594	16 Jun	Isthmus	1999	Penikese I., MA	ASY
1162-65598	9 Jun	Isthmus	1999	Penikese I., MA	ASY
1172-06138	29 Jun	Tubb's	28 Jun 97	Great Gull I., NY	Chick
1172-07836	19 Jun	Tubb's	1 Jul 97	Great Gull I., NY	Chick
9802-44627[b]	8 Jun	Isthmus	23 Jun 94	Great Gull I., NY	Chick
9802-46852	21 Jun	Isthmus	26 Jun 94	Great Gull I., NY	Chick
9802-70013[b]	17 Jun	Isthmus	19 Jun 93	Great Gull I., NY	Chick
9802-70181	19 Jun	Tubb's	20 Jun 93	Great Gull I., NY	Chick
9802-73440	20 Jun	Tubb's	23 Jun 93	Great Gull I., NY	Chick
9802-74164[b]	10 Jun	Isthmus	23 Jun 93	Great Gull I., NY	Chick
9802-76142	15 Jun	Isthmus	26 Jun 93	Great Gull I., NY	Chick
9822-06516[b]	14 Jun	Isthmus	30 Jun 95	Great Gull I., NY	ASY
9822-08481	24 Jun	Isthmus	11 Jul 94	Great Gull I., NY	Chick
9822-31668[b]	21 Jun	Isthmus	18 Jun 95	Great Gull I., NY	Chick
9822-31721	19 Jun	Tubb's	18 Jun 95	Great Gull I., NY	Chick
9822-34573	21 Jun	Isthmus	28 Jun 95	Great Gull I., NY	Chick
9822-35446[b]	22 Jun	Tubb's	22 Jun 95	Great Gull I., NY	Chick
9822-37265	20 Jun	Tubb's	23 Jun 95	Great Gull I., NY	Chick
9822-47627	24 Jun	Isthmus	10 Jul 97	near Mattapoisett, MA	Chick
9822-77943	24 Jun	Isthmus	18 Jun 99	near Cuttyhunk I., MA	AHY[c]

[a] ASY = after second year, [b] = captured on the Isthmus on Penikese I. in 1999, [c] AHY = after hatch year

Table 11. Ages and banding years of nesting Common Tern adults trapped on Penikese Island, 1999.

Year	Age	No. of Adults	% of Total Birds of Known Age
1981	Chick	1	4
	ASY[a]	-	
1986	Chick	1	4
	ASY	-	
1987	Chick	1	4
	ASY	-	
1988	Chick	1	4
	ASY	-	
1992	Chick	1	4
	ASY	1	
1993	Chick	7	25
	ASY	-	
1994	Chick	4	14
	ASY	-	
1995	Chick	6	21
	ASY	4	
1996	Chick	-	-
	ASY	3	
1997	Chick	3	11
	ASY	-	
1998	Chick	3	11
	ASY	-	
1999	Chick	-	-
	AHY[b]	1	
	ASY	11	

[a] ASY = after second year

[b] AHY = after hatch year

Table 12. Bird bands used on Penikese Island, 2000.

Species banded	Age	Band numbers used
Common Tern	adult	**1103**-12151 to –155; -165 to –168; -191 to -194; -705 to -706; -712 to -713; -749 to -753; -756; -758 to -760; -771 to -773; -781 to -782. **1162**-65685 to -700. **1192**-14801 to -812.
	chick	**1103**-12156 to –164; -169 to -190; -195 to -200; -701 to -704; -707 to -711; -714 to -748; -754 to -755; -757; -761 to -770; -774 to -780; -783 to -856; -860 to -869. **1152**-71201 to -217; -219 to -220.
Herring Gull	chick	**716**-26974 to -27000. **1046**-46100 to -179. **4007**-80421 to -423; -425.
Great Black-backed Gull	chick	**737**-42487 to -500. **4007**-80411 to -420; -424; -426 to -427; -499.

Appendix 1. Bird species sighted on Penikese Island, 12 April and 19 April to 26 July 2000.

Status: M = Migrant/non-breeder (81 species), N = Nesting species (21 species), P = Possible nesting species (11 species).
Maximum no.: Maximum number of individuals observed on a single date during the season.

COMMON NAME	SCIENTIFIC NAME	STATUS	Dates of Occurrence	Date (Maximum no.)
Red-throated Loon	*Gavia stellata*	M	5/12(2)	5/12(2)
Common Loon	*Gavia immer*	M	4/27-5/25	5/11(8)
Yellow-nosed Albatross	*Diomedea chlororhynchos*	M	5/9	5/9(1)
Leach's Storm-Petrel	*Oceanodroma leucorhoa*	P	mid-Apr – 7/16	6/29(4)[a]
Northern Gannet	*Morus bassanus*	M	5/9-17	5/11(50)
Double-crested Cormorant	*Phalacrocorax auritus*	M	4/12, 4/19 – 7/26	***
Great Cormorant	*Phalacrocorax carbo*	M	4/21, 5/11	4/21, 5/11(1)
Great Blue Heron	*Ardea herodias*	M	4/29, 5/4,6, 6/16,19, 7/12,13,19,24	4/29(2)
Great Egret	*Ardea alba*	M	4/20,21, 5/11,15,31, 6/24, 7/12	5/11,31(2)
Snowy Egret	*Egretta thula*	B	4/12, 4/19 – 7/26	7/12(20); est. 5-10 nests
Little Blue Heron	*Egretta caerulea*	M	7/12	7/12(1)
Green Heron	*Butorides virescens*	M	7/5	7/5(1)
Black-crowned Night-Heron	*Nycticorax nycticorax*	B	4/12, 4/19 – 7/26	est. 10-15 nests
Glossy Ibis	*Plegadis falcinellus*	P	5/9-20, 5/30 – 6/2,13, 7/1-118	7/1,16(3)
Turkey Vulture	*Cathartes aura*	M	5/13-31	5/13-31(1)
Canada Goose	*Branta canadensis*	B	4/12, 4/19 – 7/26	***
Mute Swan	*Cygnus olor*	M	5/11	5/11(2)
Gadwall	*Anas strepera*	B	4/19 – 7/3	6/3(8); min. 2 nests
American Black Duck	*Anas rubripes*	M	4/19,20, 5/6,11,20, 6/10,18	5/11(5)
Mallard	*Anas platyrhynchos*	B	4/20- 6/19	5/20(4); min. 4-5 nests
Blue-winged Teal	*Anas discors*	M	5/6	5/6(2)
Northern Shoveler	*Anas clypeata*	M	4/12,20	4/12,20(1)
Green-winged Teal	*Anas crecca*	P	4/12, 4/19 – 7/10,23	4/20(16)
Common Eider	*Somateria mollissima*	B	4/12, 4/19 – 7/26	***min. 28 nests[b]
Surf Scoter	*Melanitta perspicillata*	M	4/19, 5/11	5/11(30)
Black Scoter	*Melanitta nigra*	M	6/9-13	6/9-13(1)
Red-breasted Merganser	*Mergus serrator*	M	4/12, 4/19 – 6/1,17	4/21(50)
Osprey	*Pandion haliaetus*	M	4/12, 4/19 – 7/26	4/12, 4/19 – 7/26(2)
Northern Harrier	*Circus cyaneus*	M	4/20, 4/26 – 5/1, 6/3, 6/16 – 7/19	4/20, 4/26 – 5/1, 6/3, 6/16 – 7/19(1)
[Sharp-shinned] Hawk[c]	*Circus [cyaneus]*	M	4/29	4/29(1)
Cooper's Hawk	*Accipiter cooperii*	M	5/9	5/9(1)
Broad-winged Hawk	*Buteo platypterus*	M	5/11	5/11(1)

COMMON NAME	SCIENTIFIC NAME	STATUS	Dates of Occurrence	Date (Maximum no.)
Red-tailed Hawk	*Buteo jamaicensis*	M	5/28,29	5/28,29(1)
American Kestrel	*Falco spaverius*	M	4/26,27	4/26,27(1)
Merlin	*Falco columbarius*	M	5/3	5/3(1)
Peregrine Falcon	*Falco peregrinus*	M	5/18,20	5/18,20(1)
Virginia Rail	*Rallus limicola*	P	4/29 – 7/26	min. 5 territories
Black-bellied Plover	*Pluvialus squatarola*	M	4/19 – 6/7	4/19(9)
Semipalmated Plover	*Charadrius semipalmatus*	M	5/3-20, 7/24	5/11(5)
Killdeer	*Charadrius vociferus*	B	4/12, 4/19 – 7/26	*** min. 5 nests
American Oystercatcher	*Haematopus palliatus*	B	4/12, 4/19 – 7/26	4/20, 7/4(8); min. 2 nests
Greater Yellowlegs	*Tringa melanoleuca*	M	4/28 – 5/28, 6/30 – 7/8,18-21	5/1(5)
Lesser Yellowlegs	*Tringa flavipes*	M	6/28	6/28(1)
Willet	*Catoptrophorus semipalmatus*	M	4/27 – 5/26, 6/7-9, 6/22 – 7/22	4/27(3)
Spotted Sandpiper	*Actitis macularia*	B	5/1 – 7/26	min. 4-5 nests
Whimbrel	*Numenius phaeopus*	M	5/27,28, 7/6,21	7/21(2)
Ruddy Turnstone	*Arenaria interpres*	M	4/19, 5/15 – 7/12,23	6/3(15)
Semipalmated Sandpiper	*Calidris pusilla*	M	5/30, 7/1	5/30(2)
Western Sandpiper	*Calidris mauri*	M	7/3	7/3(1)
Least Sandpiper	*Calidris minutilla*	M	4/3, 5/10-12,27, 7/5-11	7/7(9)
White-rumped Sandpiper	*Calidris fuscicollis*	M	5/30,31	5/31(4)
Unidentified "peep" sandpipers[c]	*Calidris* spp.	M	7/9-24	7/11-13(20)
Purple Sandpiper	*Calidris maritima*	M	4/20 – 5/26	4/21(60)
Dunlin	*Calidris alpina*	M	4/21, 5/14,17	5/17(2)
Short-billed Dowitcher	*Limnodromus griseus*	M	6/15,17	6/15,17(2)
Dowitcher spp.[c]	*Limnodromus* spp.	M	5/18, 6/10 - 7/26	7/7(42)
Laughing Gull	*Larus atricilla*	M	4/21, 5/11-31, 6/10-20, 7/13-21	7/14(39)
Bonaparte's Gull	*Larus philadelphia*	M	5/5-17	5/8-15(2)
Herring Gull	*Larus argentatus*	B	4/12, 4/19 – 7/26	census (994 pairs)
Great Black-backed Gull	*Larus marinus*	B	4/12, 4/19 – 7/26	census (130 pairs)
Roseate Tern	*Sterna dougallii*	M	5/4 – 7/26	5/17,25(100)
Common Tern	*Sterna hirundo*	B	4/28 – 7/26	est. 186 pairs
Arctic Tern	*Sterna paradisaea*	B	5/8 – 7/26	est. 4-5 pairs
Least Tern	*Sterna antillarum*	M	5/10-16, 6/7 – 7/15	6/13,28(3)
Black Tern	*Chlidonias niger*	M	5/11, 6/2-17	5/11, 6/2-17(1)
Black Skimmer	*Rynchops niger*	M	6/20	6/20(1)
Mourning Dove	*Zenaida macroura*	M	5/22,23, 6/15,17,29, 7/9-24	6/29(3)
[Ruby-throated] Hummingbird[d]	*[Archilochus colubris]*	M	5/24	5/24(1)
Downy Woodpecker	*Picoides pubescens*	M	4/30	4/30(1)

COMMON NAME	SCIENTIFIC NAME	STATUS	Dates of Occurrence	Date (Maximum no.)
Northern Flicker	*Colaptes auratus*	M	4/28 – 5/3	4/28 – 5/3(1)
Eastern Wood-Pewee	*Contopus virens*	M	5/19-23	5/19-23(1)
[Least] Flycatcher[d]	*Empidonax [minimus]*	M	5/11	5/11(1)
Eastern Phoebe	*Sayornis phoebe*	M	4/27-30, 5/6	4/27-30, 5/6(1)
Eastern Kingbird	*Tyrannus tyrannus*	M	5/8-10,19	5/8-10,19(1)
White-eyed Vireo	*Vireo griseus*	M	5/11	5/11(1)
Blue-headed Vireo	*Vireo solitarius*	M	4/30, 5/9,10	4/30, 5/9,10(1)
Red-eyed Vireo	*Vireo olivaceus*	M	5/9,11,19	5/9,11,19(1)
Blue Jay	*Cyanocitta cristata*	M	5/4-13,26,29, 6/10,28	6/26(6)
American Crow	*Corvus brachyrhynchos*	M	4/12,20,21, 5/6,13	4/12(2)
Tree Swallow	*Tachycineta bicolor*	P	4/28 – 6/1,28,29, 7/25,26	7/26(4)
Northern Rough-winged Swallow	*Stelgidopteryx serripennis*	P	5/5-31	max. of “a few” (<5) at a time
Bank Swallow	*Riparia riparia*	P	5/3 – 7/26	***
Barn Swallow	*Hirundo rustica*	B	4/20 – 7/26	***
Red-breasted Nuthatch	*Sitta canadensis*	M	5/2-17	5/9(3)
Ruby-crowned Kinglet	*Regulus calendula*	M	5/2-10,22	5/2,5(2)
[Hermit] Thrush[c]	*Catharus [guttatus]*	M	5/2	5/2(1)
Wood Thrush	*Hylocichla mustelina*	M	5/2	5/2(1)
American Robin	*Turdus migratorius*	P	4/21 – 5/2, 6/18- 7/17	6/24(3)
Gray Catbird	*Dumetella carolinensis*	P	5/3 – 7/26	5/11(4)
Northern Mockingbird	*Mimus polyglottos*	M	4/29, 5/5, 6/29, 7/10,23	4/29, 5/5, 6/29, 7/10,23(1)
Brown Thrasher	*Toxostoma rufum*	M	5/8,11,12	5/8,11,12(1)
European Starling	*Sturnus vulgaris*	B	4/12, 4/19 – 7/26	***
Northern Parula	*Parula americana*	M	5/9,10	5/9,10(1)
Yellow Warbler	*Dendroica petechia*	M	5/2-24, 6/9	5/8(3)
Magnolia Warbler	*Dendroica magnolia*	M	5/8,17,24,25	5/8(2)
Yellow-rumped Warbler	*Dendroica coronata*	M	5/2-17	5/5,8,17(2)
Black-throated Green Warbler	*Dendroica virens*	M	5/11	5/11(1)
Blackburnian Warbler	*Dendroica fusca*	M	5/10	5/10(1)
Black-and-White Warbler	*Mniotilta varia*	M	5/8,10	5/8,10(1)
Ovenbird	*Seiurus aurocapillus*	M	5/6	5/6(1)
Common Yellowthroat	*Geothlypis trichas*	B	5/5 – 7/26	***
Canada Warbler	*Wilsonia canadensis*	M	5/23	5/23(1)
Eastern Towhee	*Piplo erythrophthalmus*	M	5/1 – 6/5	5/9,10,12(2)
Chipping Sparrow	*Spizella passerina*	M	5/2-6	5/2,5(2)
Savannah Sparrow	*Passerculus sandwichensis*	P	4/19 – 7/26	***
Song Sparrow	*Melospiza melodia*	B	4/12, 4/19 – 7/26	***

COMMON NAME	SCIENTIFIC NAME	STATUS	Dates of Occurrence	Date (Maximum no.)
White-throated Sparrow	*Zonotrichia albicollis*	M	4/29 – 5/11,24,25	5/2(40)
White-crowned Sparrow	*Zonotrichia leucophyrs*	M	5/5-17, 6/12	5/5-17, 6/12(1)
Northern Cardinal	*Cardinalis cardinalis*	M	4/28	4/28(1)
Rose-breasted Grosbeak	*Pheucticus ludobicianus*	M	5/21	5/21(1)
Red-winged Blackbird	*Agelaius phoeniceus*	B	4/12, 4/19 – 7/26	***
Common Grackle	*Quiscalus quiscula*	B	4/12, 4/19 – 7/26	***
Brown-headed Cowbird	*Molothrus ater*	B	4/27 – 5/8, 6/4-6	4/28,30(4)
Baltimore Oriole	*Icterus galbula*	M	5/8-10	5/8-10(1)
House Finch	*Carpodacus mexicanus*	M	6/7	6/7(2)
American Goldfinch	*Carduelis tristis*	P	4/29 – 5/10,24, 6/7 – 7/9, 7/19,24	5/3(10)
House Sparrow	*Passer domesticus*	B	4/12, 4/19 – 7/26	***

[a] Storm-Petrels consistently were heard calling at night from burrows in the rock wall by Penikese Island School's house throughout season. No searches for eggs or chicks were made.

[b] Number of eider nests encountered during 24 May to 6 June gull census, but several other nests and broods seen outside of the census period.

[c] Unconfirmed sighting; identification too tentative to include as a separate species, so not included in total count of 113 species.

[d] Not identified positively to species but cannot be any of the other species on this list that were definitively identified.

*** Common nester or possible nester, but not counted; individuals appeared to occupy all or most suitable habitat